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## REPORT

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Sava River

1. The Sava River is characterized by its sand deposits. When the river is low, dredges are in constant operation and are even then barely able to keep the navigation channels open. The river is fairly navigable while the water level in Belgrade is plus 50. Any level below this mark causes difficulties, and barges often must be pulled over sand bars one by one, when the complete convoy is unable to pass. At such times, barges are not loaded to full capacity. The water in the channels is sometimes only 110 or 120 centimeters.
2. The most difficult passages on the Sava are at Bosanski Samac (kilometer 308 to kilometer 263)<sup>1</sup>, and at Bosanska Raca (kilometer 177 to kilometer 156). In these two sectors convoys are escorted by pilots, and each sector has its own pilots.
3. Apart from the above two sections, there are several others which are slightly less difficult: the mouth of the Lonja tributary (kilometer 546); Cvjetni-Vir (kilometer 530); Kraplje (kilometer 524); Mlaka (kilometer 484); Mackovac (kilometer 443); Orubica (kilometer 432); Kobas (kilometer 396); Zbjeg (kilometer 377); Svilaj (kilometer 326); Oraslje (kilometer 258); Misarski Plicak (kilometer 100); Orasac (kilometer 96); Visojevacski Plicak (kilometer 93); Podgoricka Ada - Kamčak (kilometer 83); Orljaca (kilometer 72); the ferryboat at Kupinovo (kilometer 55); Progarska Ada (kilometer 47); and the mouth of the Klobara tributary (kilometer 27). In all of these sectors dredges are at work at least a part of each year, and in some of them there is continual dredging during low water periods.
4. The Sava also has numerous bends in which the sand deposits build up more quickly than in the straight stretches. Some primitive stone reinforcements have been constructed to fight against the erosion of the banks, but this work has been properly executed only in the ports.

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5. The length of the navigable part of the Sava River varies between 597 and 592 kilometers depending on the water level. When the water is low, only small propeller-driven ships can operate between the mouth of the Kupa River (kilometer 592) and Sisak, pulling one barge at a time. At medium or high water level, convoys can reach Sisak without difficulty. At medium or high water level, all ships which normally navigate on the Danube River can operate on the Sava as well. During low water periods, only smaller ships can be used.
6. The best water level for navigation on the Sava is when the level in Belgrade is plus 50. At that time, the level in the sectors mentioned in paragraph 3 above is between 2.50 and 2.80 meters. The rest of the river averages approximately six to eight meters in depth; where it joins the Danube the depth is 15 to 18 meters. The low water period comes in July, August and September; however, it can begin as early as the end of March, depending on the amount of precipitation during the winter. The speed of the river is about four or five meters per second.
7. The Sava is one of the principal waterways of Yugoslavia. All along its length are numerous ports which load large quantities of coal, particularly from the Raca mines; wood for fuel, building, and export; grain from the Mitrovica-Lacarak area; and oil and gasoline from the refinery at Sisak.

Tisa River

8. The Tisa River is important because it connects Yugoslavia and Hungary, both through its own course and through the canals Kralja Petra and Sugavica which connect it with the Danube River. For purposes of navigation the river is divided into three sectors: from Taka (kilometer 532) to Solnok (kilometer 327); from Solnok to Segedin (kilometer 170); and from Segedin to the Danube. Yugoslav ships can sail only on the last sector. On the two upper sectors only small ships, of 25 to 50 horsepower, and 50 to 100-ton barges are used. On the lower sector normal Danube type barges are used, but are not loaded to full capacity. During the low water periods navigation is practically impossible on the two upper sectors, and even in the lower sector some passages are only 120 to 130 centimeters deep.
9. Particularly shallow passages in the lower section are the following: Josipovac (kilometer 140); Evgenijevo Ostrvo-Potinski Sv. Nikola (kilometer 120 to 117); Ada (kilometer 102 to 100); the passage at Stari Beckerek (kilometer 72) to New Beckerek, now Vorosilov Grad (kilometer 65); kilometers 62 to 56; and Liavad (kilometer 14). These passages have about 180 to 190 centimeters of water when the level at Titel is zero. When the level at Titel is plus 50, the water level is considered medium and the speed of the river is about three meters per second.
10. Ice is not a big problem in the Tisa. Ships spend the winter tied up at any point along the bank, and there are no closed winter shelters. The freezing point of the Tisa is at three or four degrees centigrade below zero.

Bosna River

11. The Bosna River, which enters the Sava River at kilometer 309, is relatively shallow and narrow. At its deepest point it is three or four meters deep, and at its shallowest, about 20 to 30 centimeters. There are many underwater rocks in the river. The speed of the river is about ten meters per second.

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12. Navigation on the Bosna is impossible for self-propelled ships and barges. The only transportation on the river consists of rafts composed of logs which are being guided down the river to the places where they will be used. These rafts usually contain about 500 or 600 cubic meters of wood, or about forty tree trunks, each. They are piloted by four or five men.

Bosut River

13. The Bosut River is another tributary of the Sava, which it enters at kilometer 160. It is not navigable, even for rafts. At very high water, some barges are pulled by hand about 1,000 meters up from the mouth for the loading of tree trunks.

• Una River

14. The Una River flows into the Sava at kilometer 506. It is not navigable.
15. The above tributaries bring to the Sava River a great amount of water, but they also hinder navigation by carrying into the Sava sand and stone deposits, as well as ice during the winter months.

Tamis River

16. The Tamis River is a tributary of the Danube at kilometer 1,154. It is navigable only to three kilometers from its mouth. On these three kilometers Danube-type ships and barges can be used, while the upper part of the river is too shallow for any kind of ship. Medium or small propeller-driven ships are usually used because of their greater maneuverability. During low water the average depth is only one meter, and navigation is interrupted. The river flows very slowly and is convenient for a winter shelter. Although the water freezes at two or three degrees below zero, the ice is not dangerous for ships and barges.
17. The maintenance of the rivers of Yugoslavia is the responsibility of the Section for Marking and Maintaining the Navigational Channels, part of the hydro-technical section of one of the ministries in Belgrade. International rivers are kept in better condition than completely Yugoslav rivers such as the Sava, since certain international regulations concerning the maintenance of international rivers must be complied with.

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☐ Comment: Kilometer readings in all cases indicate the distance from the mouth of the river concerned.